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ABSTRACT

Neurological impairment as discussed includes a range of disabilities referred to as neurological impairment: minimal brain dysfunction/damage, developmental disability, perceptual handicap, learning disability, hyperkinetic behavioral syndrome, and others. Defined are causes of neurological impairment and methods of diagnosis. Symptoms (characteristics) of impaired neurological functioning are described, as are possible treatment approaches. Also examined are the psychological implications of this type of disability for the child and his parents, and the implications of neurological impairment in the bilingual/bicultural (minority group) child. Ten recommendations concerning treatment and programs conclude the pamphlet. (KW)

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PERSPECTIVE

Neurological Impairment: nomenclature & consequences

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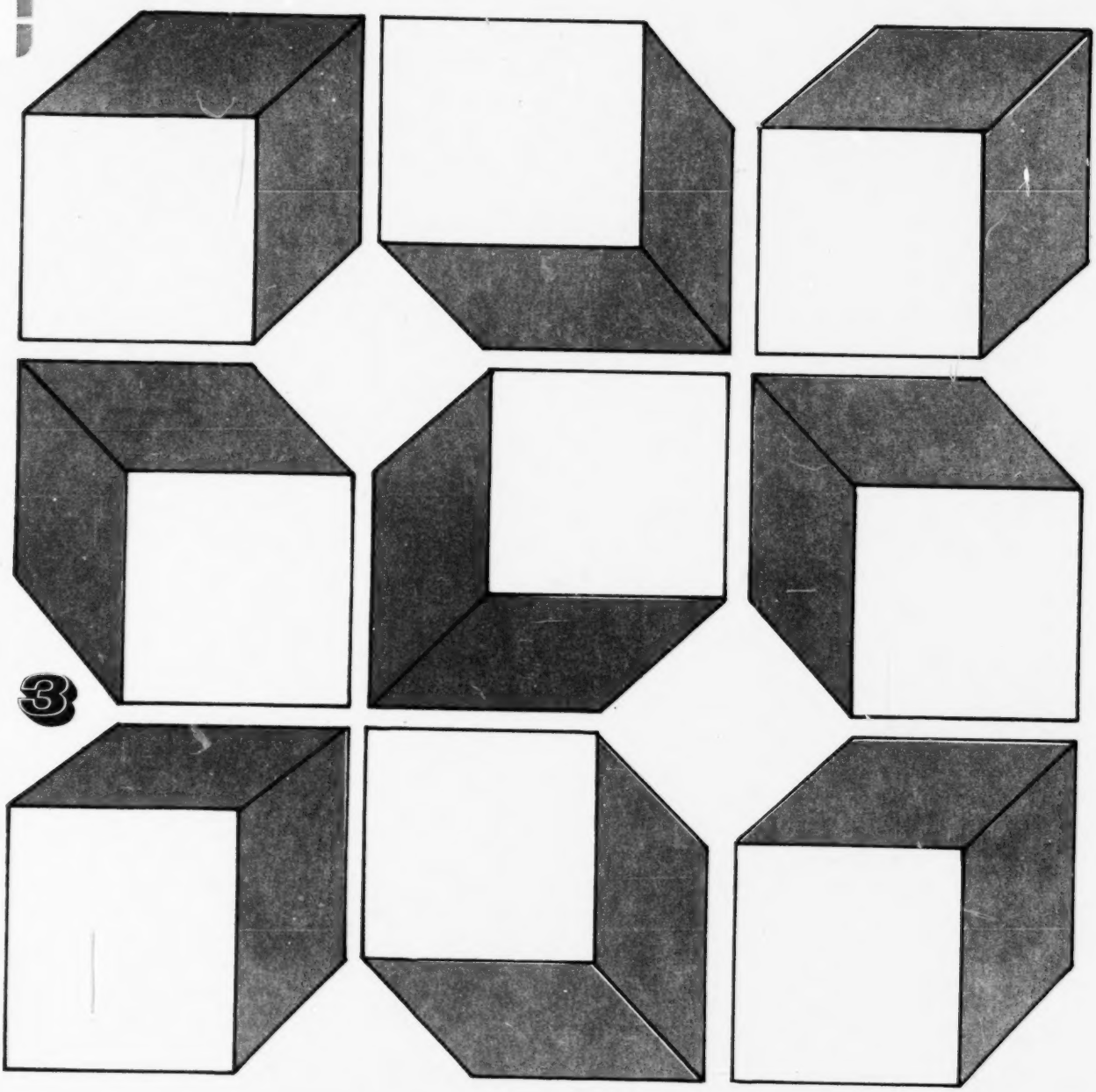

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NEUROLOGICAL IMPAIRMENT
NOMENCLATURE AND CONSEQUENCES
An Issue Paper on a Topical Subject in Education

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INTRODUCTION

The neurologically impaired child has a special position in our society, and often it is a very lonely one. His deficiency is as absolute as that of a child who cannot see or walk, but it may be harder to surmount and it is certainly more difficult for the layman to comprehend.

This document defines the causes and characteristics of the range of disabilities referred to as neurological impairment; it also examines the psychological implications of this type of disability for the child. The technical information included here is necessary for a working knowledge of what learning disabilities mean, both to the afflicted child and to others in his environment. The authors also take note of some of the training programs that have been developed to assist the disabled child in the difficult and frustrating task of learning. In the last section, the plight of the neurologically impaired minority group child who is both bilingual and bicultural is described.

This paper will be of particular interest to special education teachers, but may be of even greater value to teachers of normal children. Every child spends a substantial amount of his life in school, and the reinforcement he receives from his peers is crucial to his social development. For the neurologically impaired child, the effects of interaction with normal children who do not understand his situation can be traumatic and long lasting. It is our hope that the information presented here will give teachers, administrators, and parents more insight into the confusing and anxiety-laden world of the neurologically impaired child, and that they in turn will encourage greater tolerance and understanding among normal children for their disabled classmates.

Stanley J. Salett
Assistant Commissioner
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I. DEFINITION

The practitioners who work with the neurologically impaired child--pediatricians, teachers, learning disabilities specialists, visual and audio perception trainers, psychologists, remedial reading teachers--have coined almost 40 different labels to describe him. Some of these terms are moderately helpful, but most fail to accurately describe the damage to the nervous system and the range of consequences. Listed below is a brief sampling of some of the terms used in the literature:

Minimal brain damage
Cerebral dysrhythmia
Minimal cerebral dysfunction
Developmental disability
Perceptual handicapped
Specific learning disability
Delayed neural maturation
Developmental dyslexia
Hyperkinetic behavioral syndrome
Behavioral disorders
Language disorders
Choreiform syndrome
Strauss syndrome
Educational handicapped
Hyperkinetic impulse disorder

We should keep in mind, when using these terms, that the neurologically impaired child often has average or above average intelligence. For the purposes of this paper it is convenient to think of neurological impairment as flaws in the neural circuitry, ranging from minor (subclinical) to catastrophic (severe disablement), that proceed from a variety of causes (See Section II, The Etiology of Neurological Impairment), which give rise to a range of specific performance consequences (See Section IV, the Symptomatology of Neurological Impairment).

In all likelihood a satisfactory 2- or 3-word definition of neurological impairment may never arise, unless such definitions are clearly understood as shorthand for a complex subject We can, however, single out the two key ingredients: 1) an aberration in the neural network (brain, sensors, and related neural apparatus) that delays, complicates, and impedes the development of the human organism on various levels of functioning, and 2) an impairment in learning which gives rise to a deficiency in quality of production, which, in turn, lessens the value and strength of an individual's self-concept and/or self-image.

The description of neurologically impaired children given in the NINDB Monograph No. 3, entitled "Minimal Brain Dysfunction in Children"* is a complete and comprehensive compilation of terminology and identification. The term "Minimal Brain Dysfunction" is used to designate a large group of children whose neurological impairment is "minimal," subtly affecting learning and behavior without necessarily lowering of general intellectual capacity. The term "Minimal Brain Dysfunction Syndrome" refers to children with near average, average or above average general intelligence, with certain learning or behavioral disabilities ranging from mild to severe which are associated with deviations of function of the central nervous system. These deviations may manifest themselves by various combinations of impairment in perception, conceptualization, language, memory and control of attention, impulse or motor functions.

In addition, we offer the following definitions: a neurologically impaired child is one who demonstrates maturational, developmental and biological clocks whose timing does not conform to accepted normal standards and whose behavior, social drives and educational achievement is affected.

II. ETIOLOGY OF NEUROLOGICAL IMPAIRMENT

In addition to the causal factors in neurological impairment, we are also concerned with the severity and degree of handicap and the prognosis for habilitation. The time at which a difficulty arises determines the above. Hence, four time phases will be explored.

Phase one is the prenatal period, known as the growth perior of the unborn child from the time of conception to the time of delivery. The course of the developing fetus depends greatly upon the health of the mother both at the time of conception and the formation of the placenta, and throughout the pregnancy. An important factor is the reproductive age of the mother and the parity of the fetus. The teenager and the premenopausal female or the advanced aging female present more hazards to the fetus than females of any other age. Parity (whether the child is the first, second, third or fourth child) is likewise an important factor. Poor nutrition, drug ingestion and possibly excessive smoking seem to play as large a role in prenatal causes of difficulties as maternal diseases and infections, about which more is known. For instance, there is a great awareness of the difficulties encountered in pregnancy when the mother is a known diabetic, a hypothyroid or hyperthyroid, has other glandular dysfunctioning, neoplasms, cardiac or pulmonary difficulties, anatomical abnormalities of uterus and cervix and/or toxemia. With the increase in drug abuse and teenage pregnancies, more chromosomal abnormalities are occurring. The problems of poor nutrition in the adolescent mother, who has not fully matured herself, influence the size and maturity of the newborn. Virus diseases such Rubella (German measles) also play an important role in the formation of the fetus. Placental abnormalities such as toxemia, tumors, hydramnios (excessive amount of fluid in utero), placenta previa and abrupto (the "after birth" separating from the uterus of womb before the birth of the baby, causing excessive bleeding) cause the baby to have insufficient nourishment and oxygen.

Phase two is the perinatal or paranatal period (labor and delivery time). Long hard

*U.S. Department of Health, Education and Welfare (Washington: U.S. Government Printing Office, 1966

labors, toxema and/or convulsions due to the toxemia, hemorrahage and infection cause fetal distress. Administration of drugs and hypotonic fluids to the mother along with operative complications at the time of delivery also present problems. Therefore, the importance of good prenatal care with early identification of difficulties cannot be stressed enough.

Phase three is the neonatal period (the first four weeks of the life of the baby). Viral infections of the new baby can cause serious difficulties especially the "Herpes Simplex Hominis" type. Subdural hematoma (blood clot or collection of blood between the linings of the brain and the brain itself), convulsions, cyanotic (blue) spells and metabolic imbalance can also contribute to later neurological impairment.

Phase four is the postnatal period, which extends from four weeks of life to two years. Severe dehydration, meningitis or other infections of the central nervous system, head trauma, convulsions, nutritional deficiencies and inborn errors of metabolism, such as phenylketonuria (P.K.U. disease), interfere with the normal maturation and development of the nervous system.

With the development of newer laboratory techniques and biochemical procedures, along with new concepts of the role viruses play in the human body, particularly in utero and in the neonate, we are able to make earlier identification of difficulties. The technique of amniocentesis enables us to obtain cellular constitutents of the amniotic fluid for diagnosis of chromosomal abnormalities and inborn errors of metabolism before the fetus is four months old.

In summary, then, we can list the causative factors in neurological impairment as follows:

1. Genetic aberrations
2. Disease
3. Birth complications/trauma
4. Environmental trauma (e.g., head injury)
5. Poor nutrition

We should also note that, taking these causative factors together, the incidence of neurological impairment for the school-age population has been estimated to range from 8% to 15%. Four to ten times as many males are afflicted as females.

III. DIAGNOSIS OF NEUROLOGICAL IMPAIRMENT

In order to be able to diagnose an impairment, and more particularly, what specific areas are impaired, the examiner must know how to diagnose the "normal" child and be familiar with developmental schedules. A child grows in four areas simultaneously at approximately the same rate of speed. Let us say that a round wheel that is divided into four quadrants represents

normal growth. One quadrant would represent physical growth, one would be intellectual growth, another would be emotional growth and the fourth would be social growth. If a child is not developing in all four of the above-mentioned quadrants at the same rate of speed, he no longer is a perfect round wheel. The shape of the circle becomes distorted. A mis-shapen circle or square can be seen as representing neurological impairment. In this construct one corner could be allotted to all the children with obvious motor difficulties or deficits (e.g., cerebral palsey). Another corner could be the convulsive disorders or epilepsies; a third corner could be for the pan-retarded child whose greatest deficiency is in intellect (mental subnormalities). The fourth corner would be for the gross disorders of behavior, blindness, deafness and severe aphasias. All these disabilities would represent *major* cerebral dysfunction syndromes. Minimal cerebral dysfunctioning is considered to be the main cause of the hyperkinetic behavioral syndrome characteristic of many neurologically impaired children. The child will usually show a history of a group of the following symptoms in varying degrees and in varying combinations known as soft signs: 1) hyper-activity, which is abnormal motor activity, including speaking in disorganized torrents; 2) incoordination, poor coordination with clumsiness in gait, in hopping, heel walking, toe walking, riding a bicycle, eye-hand movements, right-left disorientation, poor or unestablished lateral dominance, digital awkwardness, tremors or athetoid movements; 3) impulsiveness or poor impulse control; 4) distractibility or inability to concentrate on appropriate stimuli and function in logical sequence; 5) short attention span or concentration; 6) impaired perception and concept formation--visual, auditory, tactile and kinesthetic senses, and memory deficits; 7) language disorders which give rise to a learning disability; 8) labile emotions--tolerance of failure and frustration is low; 9) perseveration--where the child repeats needlessly until helped to stop and 10) irregularities on the electroencephalogram (EEG) without actual seizures associated with fluctuations in behavior or intellectual function.

In neurological examinations, gross motor coordination is checked to determine whether there is an abnormal delay in the maturation of motor function, (unless this can be explained on the basis of factors outside the central nervous system). We must also examine the child's large muscle coordination. Next, fine motor coordination would be tested--individual finger to thumb opposition, buttoning, tying shoes, eye-hand coordination, throwing, catching and kicking a ball, writing with a pencil. We would also note whether he has difficulty with spatial perception. In the meantime, the examiner is asking questions, evaluating the responses as to accuracy, speed of response and use of words to express a thought. The hyperactive motor activity and short attention span should be evaluated relative to the level of parental tolerance and the child's affect in relation to parents, siblings and other children. Rapid and skilled movements of the tongue should be noted as well as the movements of the eyes. Test for color vision is also important. Particular attention should also be paid to involuntary movements, tremors, habit spasms or tics.

In addition to the medical examination delineated above, there is another set of metrics which supplements the medical analysis and evaluation. These are test batteries variously administered by psychologists, teachers, learning disability specialists on child study teams, in schools, child evaluation clinics, and hospital settings.

Dr. Donald D. Hammill, writing in *Academic Therapy*, a journal devoted to learning disabilities, provides a description of a typical test battery.*

1. Intelligence--WISC, Stanford-Binet
   Intelligence Scale (revised), Slosson
   Intelligence Test for Children and Adults

2. Language--ITPA

3. Achievement--California Achievement Tests, Metropolitan
   Achievement Tests, Stanford Achievement Tests, Jastak-Bijou Wide-Range
   Achievement Test, Durrell-Sullivan Reading Capacity and
   Achievement Tests, Gates Reading Readiness Scales

4. Speech--The Templin-Darley Tests of Articulation

5. Perceptual Motor--Bender Visual-Motor Gestalt Test,
   Marianne Frostig Developmental Test of Visual Perception,
   Wepman Auditory Discrimination Test, Graham-Kendall
   Memory for Designs Test, and the Benton Visual Retention Test

In some evaluation centers other tests are used as indicated, such as the Peabody Picture Vocabulary, forms A and B, the Leiter Test of Performance, the Hiskey Test, the Harris Test of Laterality, the House-Tree-Person Exercise, the Goodenough Draw-A-Man Test and the Rorshach. It is essential, of course, that the proper tests be used for the age group being tested.

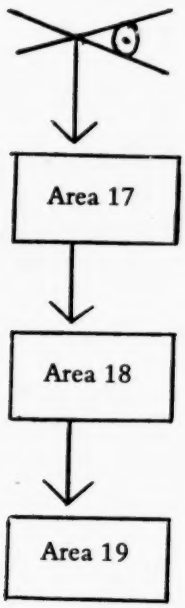
When all the above information is compiled, it is important to obtain the observations of the classroom teacher and the feelings of the child about himself. When all this information is analyzed, it enables us to determine degrees of impairment and specific deficit areas. This then becomes the basis for making prescriptions for education and training (e.g., perceptual training) and for delineating major life management problems.

IV. SYMPTOMATOLOGY OF NEUROLOGICAL IMPAIRMENT

We are all born with nervous systems--which is to say, a set group of cells, a group of structures, but we have to develop both the functions of these structures and the continuity and integration of these structures. Let us think of the brain as a computer which depends on sensing mechanisms for its information, and drive mechanisms to carry out its responses. With regard to sensing mechanisms, we are talking about various types of perception-audio, visual, tactile, etc. Let us examine some perceptual forms, using visual perception as our first example. Let us say an eye perceives an image for the first time. The image goes through the eye mechanism and is recorded on what is known as Area 17 of the occipital cortex or the visual

*Donald D. Hammill, "Evaluating Children for Instructional Purposes," *Academic Therapy*, Vol. VI., No. 4, Summer, 1971,p.343

receptive cortex. The second time the eye sees the image the same way it goes back to Area 17, where it was recorded initially, and is then transferred to Area 18 of the same occipital cortex (known as the visual associative cortex), with the notation, "I've seen this before." (see diagram)



The third time the eye sees the same image in the same way, in the same sequence, the information is then forwarded to Area 19 of the occipital cortex, only higher up, where we have sound beginning its entry (hearing) and the exit (speech) and other sensory involvement. The response of this neural registration is, "I recognize this."

By the fourth time the eye sees the same image in the same sequence, an emotional response is generated. The child might say, "I know what this is," and, in a didactic situation, he gives a correct answer. This is what breeds security and the feeling of confidence that comes from success.

Suppose, however, that something untoward happens in the passage of the image through the eye so that a different pathway is established, with the result that the child produces a "wrong" answer. It is a bewildering experience to the child not to have his perception confirmed by a teacher or family adult or sibling. Moreover, enough "wrong" answers eventually produce a neurotic and failure-oriented child.

The child with a visual perceptual disorder may experience many more failures than successes. When he enters school, after having been through a series of failures in the

visual perceptual modality, it will be difficult for him to succeed at reading and writing. Only if one can learn to see and recognize what one sees, can one hope for success in reading and writing.

Let us look now at auditory perception. Sound enters the ear and proceeds through the auditory canal till it encounters and activates the ear drum. The drum vibrates so that the three little bones behind it get the message and carry the signals to the inner ear, through the semi-circular canals and the cochlea, and then to the eighth nerve and ultimately to the auditory reception center (temporal lobe) of the brain. Sometimes these normal pathways are blocked (e.g., malfunction, disease, wax) or the message is not understood when it reaches its cerebral destination. This results in poor phonic learners and, perhaps, good visual learners who, not having learned to listen, concentrate mightily on receiving visual clues. Obviously, if a child does not hear correctly the sounds on which speech is based, he is not able to reproduce useful (i.e., correct) sounds.

There are numerous other brain functions--too numerous for delineation here. The point is that the functions of each lobe or area of the brain, plus the neural pathways and sensors, have to be developed and integrated with one another if the organism is to function adequately. Damage to the total neural system, including the neuroanatomy, or to any of the neural subsystems (e.g., a given perceptual modality) result in dysfunctional and dis-integrated individuals. Damage to the basal ganglia, the occipital cortex, or the motor cortex, for example, produces the child with cerebral palsy; similarly, damage to the thalamus can produce petit mal and damage to the motor cortex can produce grand mal; also, aberration of the limbic system and chemical imbalance will produce emotional difficulties and deleterious mood swings.

While the full range of mechanisms involved in neurological impairment is not well understood, we do have a good grasp of the range of symptoms that may be attributable to central nervous system (brain, spinal cord, and related nervous apparatus) damage and/or malfunction. Without getting into an exhaustive list of symptoms, let us now examine a few symptoms in several key areas of development and performance.

In terms of the visual modality, the neurologically impaired child often has poor visual recall, poor visual discrimination (e.g., figure-ground relationships), poor form perception; he may also have strabismus, nystagmus, amblyopia, or poor acuity, and he will very often exhibit the full range of disabilities in the visual area of language development (e.g., dyslexia, poor spelling, etc.). The child may pass acuity tests with glasses but his visual information may still be garbled.

In terms of his audio functioning, the child might have poor audio recall, poor auditory discrimination, and expressive language dysfunction; moreover, his audio functioning (also his visual functioning) may be exacerbated if he has a convulsive disorder wherein the flow of information is interrupted--even for very brief periods.

The child's perceptions of and sense of relatedness in space is another area of concern.

In this area of development and performance, the child might have poor body image, poor spatial concepts, a poor sense of laterality, directionality, balance, and, in general, a spatial disorientation.

Motor functioning (fine, gross, hand-eye coordination) is another problem area. The average neurologically impaired child is generally a clumsy child. He often has difficulties in running, climbing, jumping, hopping, skipping, holding a pencil, picking up small objects, etc. Part of his problem is sometimes the problem of "mixed dominance" (confusion about and delayed choice of left handedness or right handedness) and confused laterality. Obviously, the prognosis for such a child, with regard to participating in sports requiring high degrees of coordination, such as baseball, is very bleak.

It is worth inserting here a brief remark on the temporal relationships of the neurologically impaired child. Generally, the child has a much slower learning style/pace. Thus, time-related tests will penalize him. He also suffers from a general temporal disorientation that precludes the adequate development of temporal assessment equipment. It is almost impossible to get across concepts of yesterday, a week from Tuesday, and fifteen-minutes-from-now to many of these children. Mothers of neurologically impaired children will postpone the announcement of a trip until one-half hour before departure to forestall hours of "Is it time yet?""Are we almost ready to go?" Perceptions of time and space, the basis of Einstein's Theory of Relativity are two immutable basic facts of human existence; when both are disoriented, we see an individual who is profoundly disabled in his universe.

When one adds to the above deficits such neurological elements as tremors, convulsive disorders, the abnormal EEG, and the negatively synergistic factors of poor inter-and ultra–sensory integration and the presence of multiple handicaps, one can only be amazed at the adaptability and survivability of the neurologically impaired child.

At the level of behavioral functioning, the neurologically impaired child is sometimes an explosive child whose behavior is both hyperkinetic and unpredictable. In some cases, though, his behavior is hypoactive. In other cases we find states of hypoactivity alternating with states of hyperactivity. For the most part, however, we see bizarre and frenetic behavior–poor control over one's impulses, random tactile and motor activity, and a large amount of perseverative (senselessly and misdirected repetitious behavior, including verbal) behavior. Lastly, in this dysfunctional behavioral repertoire, we see delayed speech and locomotion, and as a consequence, sometimes delayed public school entry.

It should be no wonder, then, in view of the foregoing, that the emotional and academic development of the neurologically impaired child is in great jeopardy. Consider what the neurologically impaired child brings to the educational scene. He brings: short attention span, running-amok-behavior, the full range of language acquisition impediments, and delayed readiness for a variety of academic tasks. His teacher might well perceive him as an anti-learner. She will note that he has poor sequential learning and/or recall abilities, poor association of ideas, poor concept formation and inability to handle abstractions, poor ability to concentrate and

follow directions, poor ability to integrate in group activities, is very unready for training in basic arithmetic and communication skills, and so forth.

The emotional consequences, at this point, should be clear. The average neurologically impaired child has a poor self-image, manifests more anxiety and over-reactiveness, is overly sensitive, shows lower frustration thresholds, and is noticeably maladaptive when it comes to coping with stress (e.g., a new student in the class) and change (e.g., a gift of new clothing).

It should also be noted here that the basic *social* drives of the disabled learner--curiosity, the need for status and companionship--are also often blunted and frustrated. When curiosity is not satisfied, it is discouraged; when the achievement of status, which comes through performance and mastery, is thwarted (as in massive blockages to learning), feelings of self-worth are diminished; and when the drive for companionship and "belongingness" goes unfulfilled by being "put down" or not accepted by one's peers, the child's world becomes more lonely and his social resources more barren. The variables of his existence become negatively reinforcing.

Over the past few years, psychiatrists have been emphasizing the effect of a malfunctioning Limbic System on behavioral and emotional responses. This system is located in the thalamus, where the integrative processes are also developing, and can account for the mood swings observed in the neurologically impaired child. This also can explain why sometimes the neurologically impaired child is often first diagnosed as emotionally disturbed or behaviorially maladjusted.

Let us conclude our section on symptomatology by noting that the neurologically impaired child who survives the public educational offerings is the child/learner victorious. He has had to surmount obstacles that the teachers in his schools have seldom either experienced or understood. He is, in some ways, the supreme learner who has refused to abide by the conditions of damage and who has at least in part, contradicted his prognosis. Let us marvel at his strength and his adaptability.

V. TREATMENT APPROACHES TO NEUROLOGICAL IMPAIRMENT

Because neurological impairment is a basic physiological problem, anything that has a bearing on the child's physiology is of paramount importance. Attempts at the medical control or regulation of the behavior of neurologically impaired children center in the administration of several types of drugs. Typical are the following: anti-depressants, such as thioridazine (Mellaril); quieting agents, such as methylphenidate (Ritalin); amphetamines such as Dexedrine; tranquilizers*, such as chlordiazepoxide (Librium) and chlorpromazine (Thoraxine); and anti-convulsants, such as diphenylhydantoin (Dilantin). This list is illustrative and is not meant to show the full range of pharmacologic prescriptions.

Linked to the concept of medical regulation is the nutritional approach. A well-

*It should be remembered that stimulating drugs such as the amphetamines work in reverse fashion in young children.

balanced diet is quite important. Without examining in detail the regimens specified by the advocates of mega-vitamin therapy, it would be fair to cite the fact that several of the B vitamins are used extensively as part of the therapeutic regimen. These are as follows: niacinamide (B2), thiamin (B1), and pyridoxine (B6). These are administered in varying dosages depending on the child's needs and toleration threshold.

As was mentioned earlier, "perceptual handicap" is one of many synonyms for neurological impairment. Thus, it is centrally important to discuss therapy as it involves various perceptual modalities. Let us begin with the area of visual perception. The optometrists, as distinct from the opthamologists, have done the bulk of the work in developing orthoptic training programs (i.e., pertaining to the development of normal binocular vision). While these programs are popular among parents, medical people continually cite the absence of scientifically rigorous data (e.g., the establishment of control groups). Part of the orthoptic training program involve various types of visual-motor training (e.g., hand-eye coordination). In addition, many school programs, through the use of Frostig, Winterhaven, and parquetry materials, also provide visual perceptual training.

The area of audio perceptual training, though lacking some of the techniques employed in the area of visual perceptual training, nevertheless has come treatment approaches. Among these are the audio-visual-tactile programs involving the talking typewriter, the talking page, and the voice mirror. In addition, the "Tomatis Effect" equipment utilized by Dr. Alfred Tomatis in Paris and by Dr. Agathe Sidlauskas at the University of Ottawa is worthy of mention. Other treatment approaches in the audio area include amplification equipment, conventional recording equipment, and speech therapy.

There are also other perceptual training areas, such as tactile perceptual training, which involve a great deal of tactile stimulation and the use of materials such as the sandpaper alphabet figures.

Probably the most famous of the motor training programs is the one developed by Doman and Deliccato at the Institute for the Development of Human Potential in Philadelphia wherein neurologically impaired persons retrace their steps (crawling, creeping) through the various stages of ontogenetic development. In a school setting, motor training may take the form of physical exercises, the use of balance boards, playing games (e.g., bean bag), and various hand-eye coordination exercises.

In terms of the child's academic development (including behavior and socialization) a number of special measures must be taken. Some states, including New Jersey, have laws which make special education mandatory. Individual school districts must provide special classes for children with learning disabilities, either in the district of the child's residence or by sending him to an adjacent district where special classes are available. These classes, necessarily, have a low student/teacher ratio (e.g., 6:1 or 8:1) and are generally taught by a teacher with special training in learning disabilities. This special teacher is often aided by a remedial reading teacher; a speech therapist, and other specialists.

Obviously, given the prevalence of audio and visual perceptual deficits, adequate development of communications skills–speaking, listening, reading, writing, and spelling–is the largest single problem of the school-age neurologically impaired child. This child will often enter the school system with poorly developed speech and visual perceptual set which makes him confuse "13" and "B", and which makes him see "b" as "d" and "p" as "q", and so forth. The teacher has to use a variety of language development approaches (for example, look say, phonics, language experience), sometimes in combination, and provide additional visual training through the use of Frostig and Winterhaven materials.

Where the parietal lobe of the child's brain has been impaired, the teacher has to experiment with a variety of materials in the area of computational skills (e.g., the Stern arithmetic materials), although in cases of severe insult to the parietal lobe, the child may never master computational skills.

The teacher of the neurologically impaired child has to get into many areas that the teacher of normal children ordinarily would not. For example, the teacher of the neurologically impaired child might have to devote considerable attention to memory training. Even the environmental design has to be reckoned with. The walls have to be painted in quiet colors and be uncluttered and sometimes windows must be partially covered to aid in extending the attention span of the hyperdistractable child. Every aspect of the teaching-learning process must be grappled with in conscious meaningful ways.

Let us share, for example, some observations of Mrs. Judy Bartholomew, a teacher of neurologically impaired children in Brookside, New Jersey.

1. The inability to make figure-ground distinctions makes it difficult for the child to focus on one word in reading.

2. Distortions in form constancy, which takes place from minute to minute or day to day, means that things appear different, which makes reading and spelling especially difficult.

3. Poor concepts of spatial relations and body position in space lead to a lack of confidence in being able to cope with the environment, to poor body image (and thus to poor self-image), to poor athletic performance, and an inability to meet peers on an equal footing.

4. In the area of visual-motor performance, poor hand-eye coordination results in difficulty in writing, drawing, and focusing on small areas for fine work. When one adds to this ataxic (balance) involvement, a simple task such as *standing* before an easel and painting becomes extremely complicated; the child must make his hand move to where the eye wants it and concentrate on maintaining his balance at the same time.

5. The auditorily handicapped child whose perceptions of sound are confused might not be able to focus auditorily to screen out unwanted audio stimuli, or he might have difficulty in clearly distinguishing vowel and consonant sounds (between "o", "e", and "u", for example). In addition, he might have poor audio memory.

Now what about the emotional problems of the neurologically impaired child, which are exacerbated upon school entry (where certain performance standards are expected)? It should be remembered that the learning disabled child is destined for more than his share of failure experiences. As a result he becomes failure-oriented, failure-prone, has a poor self-image, and develops a fair amount of anxiety in learning (and particularly in testing) situations. It is probably a truism that any child with a handicap develops a secondary emotional problem as a result of not fitting the mass production mold of public education. The neurologically impaired child, even though his disability may be "invisible," is no exception. There are four main approaches to this problem in current use. These are as follows:

1. One-to-one psychiatric care

2. Group work with a school psychologist

3. The modification of behavior through operant conditioning (i.e., contingency management or techniques of positive reinforcement).

4. Parental counseling, which attempts to treat the "patient" by intervening in the lives of "significant others."

While all of the above approaches are valid, probably the most effective way to combat the development of emotional problems in disabled learners--a technique which is not in current use--is to provide sensitivity training to all non-disabled school-age children. The emotional make-up of the child is influenced by the trauma itself, his performance difficulties, and by how he is perceived and treated by those around him.

It is very important, then, to determine how a child learns before making his educational prescription. The following would have to be known: 1) does he have inner language and experience background; 2) what is his sensory input?; 3) is there neurological integration?; 4) does he have retention and memory so that he can relate past experience and look forward to a new one?; 5) how does he express himself academically, behaviorally and emotionally?; 6) what is his emotional involvement and effort?

VI. WHAT NEUROLOGICAL IMPAIRMENT MEANS TO THE CHILD AND HIS PARENTS

The problems of neurological impairment--for the child and his parents--begins, generally in the pre-school years. The parents, detecting developmental differences between the neurologically impaired child and his siblings or observing untoward behavior, report their concerns to the family physician. When a general practitioner is consulted rather than a neurological pediatrician, the parent is sometimes told that there is nothing wrong with the child or that he will "grow out of it." This is generally followed by an admonition to the parent not to be overanxious.

When the diagnosis of neurological impairment is eventually made

> by a pediatric neurologist, a member of a child study team (part of the public school system) pediatrician or other specialist, parents feel a number of deep emotions--pity or rejection of the child, shame, disbelief, and other emotions--but almost always a feeling of aloneness--often to the point of despair. Many times the initial reaction of parents is mainly fear of what 'the world' will think. What will the grandparents, the neighbors, the teachers, the playmates say (or worse think and feel)? Not only what will be their reaction to the child involved, but what will be their reaction to us--the parents?
>
> After the initial shock of diagnosis and, of course, the length of this period differs greatly with the individuals involved, parents often feel a sense of something close to relief. There is the old saying "Ignorance is bliss." That may be, but many parents have had a sneaking suspicion, if not an absolute gnawing realization that something was "wrong" or at least "different" in the child involved. Others have had the abrupt experience of being summoned to the school to be told, "Your child has a serious problem." After the initial blow--the diagnosis--which in many cases is less serious than our unspoken fears is made, it at least gives us a place to start. It is the unknown that is difficult to cope with.*

Once the diagnosis has been made and accepted,** the real *work* of child development begins for the parents--work in which parents must steer a careful course between overprotectiveness and too strict a delimiting of the child's activities and being so casually permissive as to expose the child to danger.

Perhaps the first order of business is to educate the child's siblings (and playmates and neighbors and teachers) about neurological impairment--the range of the child's performance difficulties, his limitations, and his feelings about himself. Primary in this effort is the attempt to prevent the development of feelings of shame among the siblings and to foster understanding and attitudes of helpfulness.

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*There is a general move, in various parts of the country, for parents of children with learning disabilities to get together and develop handbooks that will help other parents, delineate educational rights, and so forth. The above quotation, written by parents of neurologically impaired children, was taken from draft sections of a handbook which is currently being developed.

**Since neurological impairment is often invisible, some teachers and parents have difficulty in accepting the diagnosis, believing instead that the child is just spoiled.

If patience is a virtue in the normal population, it is an absolute requisite in the family which has a neurologically impaired child as one of its members. The relatively simple tasks of early childhood--tying shoelaces,* putting on clothing, buttoning clothing--are all disaster areas for many neurologically impaired children. Extreme patience is required of everyone with whom the child interacts.

Coping with the child's untoward behavior--hyperactivity, distractability, poor audio processing, perseveration (especially verbal perseveration), tantrums resulting from poor performance, poor control of impulsivity, exaggerated ego needs--all are extremely trying for the parents and the family constellation.

Another area of extreme frustration for parents and others in the life of the neurologically impaired child is what we might call "discontinuities in performance and achievement." A neurologically impaired child may know something one day and not the next (e.g., 2 x 4, how to read a story, recognizing the word "meadowland" while being not able to decode "was").

Also, in the area of behavior, the child might be able to master a relatively difficult task (e.g., roll down a hill) and fail to do a relatively simple task (e.g., hop on one foot). These discontinuities are also manifested in the phenomenon of plateauing, as opposed to continuous progress. They can also become rather bizarre, as in the case of children who have learned to read and then "forget" how to read.

The crisis milestones for the parents of the neurologically impaired child might be set forth as follows:

1. Securing an accurate diagnosis of the child's problems.
2. Getting the child ready for public education.
3. Finding a *proper* educational placement and supplementary therapeutic programs.
4. Finding (almost non-existent) programs for the neurologically impaired adolescent.
5. Finding vocational education and life management programs for neurologically impaired youths.
6. Finding a post-parental-death** program for the neurologically impaired youth or adult.

One group of folks in Iowa--parents of children with learning disabilities--summarized their feelings as follows:

1. Please do not make the parents feel guilty, they already do.
2. Please do not make the parents feel inadequate, they already do.
3. Please do not sympathize, and then offer no help.
4. Please do not blame the home--it exists adequate or inadequate, and your criticism only places more stress on family relationships.

*With regard to tying shoelaces, most kids learn how to do this from other kids. The neurologically impaired child, however, might only be able to learn through untying.

**A haunting question for the parents of neurologically impaired children (and of mentally retarded and emotionally disturbed children) is: "What will happen to my child when I die?"

5. Please do not say "This information is highly confidential and too technical for you to understand." *He is their child and they are entitled to know all about him.**

If the parents think they have problems--and, obviously, they do--the learning disabled child has them in spades: he cannot learn in the same styles or at the same rate that others do; he behaves in a different style, and, as a result, finds many achievement areas shut off from him. He will never excel or even adequately compete in such sports as baseball, football, basketball, and hockey, sports which require high degrees of gross and fine motor coordination. He might, however, compete successfully in swimming--but how many among us have swimming pools or access to pools on a yearly basis?

He has difficulty flying kites and riding bikes--in short, in most areas where other children do not have a problem. He approaches a given task or activity expecting to fail, and,in terms of the "expectancy conditioning" of himself and those around him, he probably loads the deck against himself. The performance of siblings and playmates all outshine him, and he is left to his own (sometimes barren) resources. He is literally dying for his environment to provide him with any kind of success experiences, so that he can attain the feeling of self-worth that comes from achievement. We are reminded here of the story by Anatole France called "The Juggler of Notre Dame," about a simple-minded person who came to Notre Dame to worship the Virgin. He could do almost nothing except juggling and yet the statue of the Virgin in the cathedral wept when he juggled as his adoration.

The neurologically impaired child rarely ever learns the techniques of juggling, but there are aspects of his existence that validate his humanity. Endeavors to identify these and enter into "a conspiracy" to aid him in finding meaning and self-worth should be a continuing process.

VII. IMPLICATIONS FOR THE BILINGUAL/BICULTURAL CHILD

The child from a minority group has exactly the same achievement needs as a child from the Anglo majority. He brings to the developmental scene, however, two important parameters: he is bilingual and he is bicultural. Given what we know about the deficits of the neurologically impaired child, when coupled with the adaptation/accommodation problem of the bilingual child, we can state, unequivocally, that the problem is at least squared.

The specific culturally reinforcing needs of the bilingual/bicultural child are such that he suffers a profound sense of dislocation relative to time, space, and society. In terms of the development of adequate communication skills, he may begin the game by being illiterate and maladaptive in two languages, lacking the equipment to close the gap. His performance in terms of cultural roles may be seriously interferred with as a result of his poor across-the-board performance.

*"Learning Disabilities--A Handbook for Parents and Teachers" (Des Moines, Iowa: Polk County Board of Education, 1970),p.2.

The bilingual child who is neurologically impaired has a foot in both minority-group culture and the dominant culture and yet belongs in neither world. The minority group kid's main concern is "How can I make it?" (without giving my heritage away). The disabled learner's concern is the same! "How can I make it without being put down as a human individual?" When both considerations come together, we have a potentially powerful negative synergism.

What we meant by a "squared problem" is this: the child with bilingual/bicultural problems has one set of adaptive tasks and accommodations to execute; the neurologically imparied child has a slightly different set; when both are brought together, we have a problem which is greater than the sum of the parts. The problems enumerated above may accelerate to the third, fourth or fifth power, depending upon such matters as the extent of prejudice, lack of educational opportunity, whether the child's family is on welfare, etc.

Let us consider for a moment, the problem of the neurologically impaired child with a convulsive disorder. Let us say, the child has momentary losses of attention, as he would, for example, in petit mal. The child would have an interruption of his attention span, not hearing what the teacher said during his "brief absence." If, during this time, a teacher was teaching a child a problem which had four steps in it, and the child heard step 1 but did not hear steps 2 and 3, but heard step 4, and 1 and 4 were not related, the child would not understand the problem. The teacher might go on to steps 5, 6, 7, and 8, but the child might only hear steps 5 and 6 and not hear steps 7 and 8.

The teacher's reaction to this might be, "They live in a world of their own; they're all daydreamers." The reaction of the neurologically impaired child, however, might be: "I was paying attention, but I somehow didn't understand; it's probably my fault."

Let us again marvel at the child who refuses to succumb, to go under. The odds are against him, yet, for the sake of his culture, his psychic identity, and his human integrity, he perseveres, and hopefully, triumphs.

The greatest drive of the learning disabled child is for success experiences. There is an important lesson here for educators: recognition of the achievement needs of all children, but especially those of disabled learners, is probably where the effective learning of the damaged child begins. This is doubly true for the learning disabled minority group child: he must adapt lingually, culturally, and academically, and, he must experience some success in each of these areas. Without this, very often, he regresses, suffers I.Q. losses, and develops the secondary handicaps of emotional disorder. The lesson is clear: we must create an environment and utilize procedures which facilitate and maximize success.

VIII. RECOMMENDATIONS

The recommendations we would make here are substantially the same as those made in an earlier paper.*

*Robert E. Weber, "The Chicanito in Special Education." a background paper presented to the National Advisory Board on Chicanos in Special Education, September, 1971.

1. The States, with Federal assistance, should begin to mount programs of early childhood development so that *early* diagnosis of learning disabilities can be obtained and remedial measures begun.

2. The pre-school programs that are developed should be comprehensive in nature, so that in addition to promoting development on the cognitive, conative, and affective levels, the child's nutritional, dental, and health needs are also accorded attention.

3. The parents of learning disabled bilingual minority group children should work with well-organized parent groups, such as the Association for Learning Disabilities, the National Society for Autistic Children, etc., to get clearly articulated statements of educational rights in a language they can understand.

4. The current abuse of labeling bilingual minority group children as mentally retarded* when they are of normal intelligence (i.e., the language barrier results in an unfavorable test score) should be immediately combatted through parent group pressure, insisting on the use of "non-penalizing" tests, and through court suits, as in the recent case in Guadaloupe, Arizona. It should also be noted here that neurologically impaired children, deaf children, and others, are sometimes, as a result of misdiagnosis, labelled mentally retarded.

5. Campaigns should be waged in those states which currently lack legislation making special education *mandatory* for disabled learners.

6. Preliminary steps ought to be taken toward the development of sensitivity training of normal children (and teachers of normal children and administrators) to stimulate more tolerance and understanding of disabled learners and to engender more feelings of helpfulness toward disabled learners. As things stand now, normal children have no understanding of learning disabilities and their standard label for any kid in a special class, be he emotionally disturbed, mentally retarded, or neurologically impaired, is: "retard."

7. Program designs should be begun--by parents and those in authority--for the "forgotten children," the learning disabled adolescent who needs entry into a special college, vocational education and work training, and a life management plan.

8. Summer day camps (with occasional "over nights") should be started to provide the learning disabled bilingual/bicultural child with an additional lift (with special provisions for a swimming program). Obviously,

*This is not a uniquely American phenomenon. West Indian children, for example, who have emigrated to other countries run a much higher risk than native-born children of being put in classes for slow learners and for the mentally retarded.

these should be subsidized where needed.

9. While it may seem paradoxical to push for more special education services and for more integration into regular school activities at the same time, according to the "normalization principle," it is desirable to have children in special classes participate with normal children in as many regular activities as possible (e.g., cafeteria, music, drama).

10. Parents and others ought to pressure legislators to make appropriations for the establishment of *comprehensive* diagnostic and evaluation centers to avoid the fragmented approach to child evaluation and to lessen the confusion of parents who have to take their child one place for speech analysis, another place for a neurological examination, and still another place for a psychological evaluation.

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